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<b>TRANSMITTAL FORM</b>  (to be used for all correspondence after initial filing)	Application Number	10/618,111	
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	First Named Inventor	Smith	
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	Tighe Paton, PLLC		
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Date	January 19th, 2006	Reg. No.	L-0226

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MAIL STOP: APPEAL BRIEF-PATENTS



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

**APPEAL BRIEF**

**EX PARTE Smith**

**Application for Patent**

**Filed July 11, 2003**

**Serial No. 10/618,111      Art Unit 1712**

**FOR: Homogenous Alumoxane-LCT-Epoxy Polymers  
and Methods for Making the Same**



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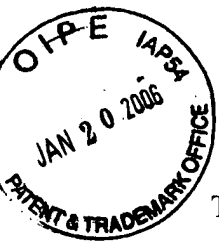
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THIS APPEAL BRIEF IS A RE-SUBMISSION BASED ON A NOTICE OF NON-CLIANCE  
MAILED DECEMBER 20<sup>TH</sup>, 2005.

I. REAL PARTY IN INTEREST

The real party in interest is Siemens Power Generation, Inc. by assignment.

II. RELATED APPEALS AND INTERFERENCES

There are believed to be no related appeals or interferences.

III. STATUS OF THE CLAIMS

Claims 1-19 are pending in this application. All claims have been finally rejected by the Examiner and are the subject of this Appeal.

IV. STATUS OF THE AMENDMENTS

Although after final remarks were made, and an in-person interview conducted, Appellant *did not file any amendments* after the Examiner's Final Office Action.

V. SUMMARY OF CLAIMD SUBJECT MATTER

The invention at hand is a liquid crystal thermoset (LCT) epoxy resins with alumoxanes materials (boehmite) homogeneously mixed therein to form a uniform dispersion and essentially complete co-reactivity of the alumoxane. The produced/cured resin has a crystalline structure that is in part responsible for the improved thermal conductivity and maintenance of dielectric strength. There are 3 independent claims at issue, namely claims 1, 12 and 15, and no dependant claims that are being argued separately.

Claim 1

Claim 1 is a method of making a homogeneous alumoxane-LCT-epoxy polymers with a dielectric strength of at least 1.2 kV/mil (see para. 20, lines 1-3) and a and a thermal conductivity in the transverse direction of at least 0.50 W/mK and in the thickness direction of at least 0.99 W/mK (para. 25, lines 11-12). The method involves mixing an LCT-epoxy resin with one or more alumoxane materials (para 20, lines 5-6) under sufficient conditions to form a uniform dispersion and an essentially complete co-reactivity of the at least one alumoxane

material with the at least one LCT-epoxy resin (experiment description and chemical diagrams beginning on page 8). This mixture is then cured (para 20, line 10). The ratio of alumoxane to the LCT-epoxy resin is a ratio of between 3:17 and 13:7 by weight (para 20, lines 7-8).

#### Claim 12

Claim 12 is a method method of making homogeneous alumoxane-LCT-epoxy polymers with a dielectric strength of at least 1.2 kV/mil (see para. 20, lines 1-3) and a thermal conductivity in the transverse direction of at least 0.50 W/mK and in the thickness direction of at least 0.99 W/mK (para. 25, lines 11-12) coated on at least one electrical insulator (para 24, lines 1-2). This comprises mixing at least one LCT-epoxy resin with at least one boehmite material (para 20, lines 5-6) and warming until the mixture is clear (para 22, line 3) and under sufficient conditions to form a uniform dispersion and an essentially complete co-reactivity of the at least one boehmite material with the at least one LCT-epoxy resin (experiment description and chemical diagrams beginning on page 8). And impregnating the mixture onto the electrical insulator can curing it (para 24, lines 1-8). Also the amount of the at least one boehmite material to the at least one LCT-epoxy resin comprises a ratio of between 3:17 and 13:7 by weight (para 20, lines 7-8).

#### Claim 15

Claim 15 is for a homogeneous alumoxane-LCT-epoxy polymers (para 25, lines 1-2) that comprising an alumoxane containing sub-structure that is organically bonded to the LCT-epoxy substructure (para 25, lines 4-5), and where the LCT-epoxy sub-structure that is thermal conductivity in the transverse direction of at least 0.50 W/mK and in the thickness direction of at least 0.99 W/mK (para 25, lines 11-12), with a dielectric strength of at least 1.2 kV/mil (para 25, line 14), and where the alumoxane substructure is approximately 15-65 % by weight (para 25, line 16). Also the homogeneous alumoxane-LCT-epoxy polymers are substantially free of particle wetting and micro-void formation (para 9, lines 6-7).

Note that only single references are made to the specification for each claim limitation. Most claim limitations appear in the specification multiple times.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Pending claims 1-9 and 11-19 are rejected under 35 USC §103 (a) as being unpatentable over Smith (5,904,984) in view of Cook (6,369,183).

B. Claim 10 is rejected under 35 USC §103 (a) as being unpatentable over Smith (5,904,984) in view of Cook (6,369,183) and in further view of Stackhouse (4,427,740).

Appellant notes that the treatment of the Inventor's affidavit stating unexpected results is part of the above grounds of rejection but presents unique issues.

## VII. ARGUMENTS

A. Pending claims 1-9 and 11-19 are rejected under 35 USC §103 (a) as being unpatentable over Smith (5,904,984) in view of Cook (6,369,183).

### Smith '984

U.S. Patent No. 5,904,984 of Smith et al. ("Smith '984"). It should be pointed out that the inventor of the invention at hand is also the Smith of the '984 patent. This invention covers LCT epoxy resins used as electrical insulators.

### Cook '183

U.S. Patent No. 6,369,183 of Cook '183 et al. ("Cook") describes a chemically functionalized carboxylate-alumoxane with a chemically reactive substituent (eg epoxy resin) that reacts with a reactive compound. As a result the alumoxane links with the reactive compound to form a polymer matrix.

Appellant respectfully traverses the Examiner's interpretation of the cited art as well as his determination that the February 24<sup>th</sup>, 2005 1.132 affidavit by Smith is unpersuasive. The fact that Appellant is only going to address the more egregious misinterpretations should not be taken as any acquiescence to the Examiner's other misinterpretations. For ease of reading and

reference, applicant has divided this argument into two separate categories. The “any commercially available epoxy resin can be used” traverse which discusses the insufficiency and misuse of the prior art, and the “sufficiency of the affidavit” traverse which discusses the improper treatment of the submitted §132 affidavit showing unexpected results.

The “any commercially available epoxy resin can be used” traverse.

The inventor Smith discovered that under certain conditions alumoxane materials (aka boehmite) can be added to liquid crystal thermoset resins (LCT) without disrupting the LCT’s crystalline structure. LCT resins are a unique class of resins that form crystalline structures and confer enhanced properties because of this. To add particles to a crystalline structure would be expected to disrupt its nature and ruin the crystallinity.

Applicant made this and other arguments in the February 24<sup>th</sup>, 2005 Amendment (page 7, 3<sup>rd</sup> paragraph) that was supported by the 1.132 February 24<sup>th</sup> Affidavit. In summary, anyone can mix the resin of Smith ‘984 with the boehmite of Cook ‘183, but that would produce a ruined resin, without the crystalline structure and without the thermal conductivity properties of the claimed invention. Therefore, there is no motivation to combine the Smith ‘984 and Cook ‘183 references to produce the crystalline resin applicant is claiming. Applicant even amended the claims to clearly call out the thermal conductivity limitations to clearly call out that applicant had discovered a structured resins with significant thermal conductivity properties.

However, the Examiner found motivation to combine theses reference in lines 14-17, column 12 of Cook. There Cook states that “any commercially available epoxy resin can be used (with Cook’s disclosure).” This is improper for the three reasons that were brought up in the After Final Reply of July 18<sup>th</sup>, 2005:

i) Such a broad, omnibus statement certainly can’t be taken at face value. It cannot be enabling. *Elan Pharm., Inc. v. Mayo Foundation for Medical and Education Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003), states that a reference must be enabling and that mere naming is insufficient if it cannot be produced without undue experimentation.

ii) Even if such a broad statement were enabling, LCT resins were not commercially available resins at the time of Cook.

iii) Even if one were to combine Cook with Smith '984 they would still not get applicant's claimed invention. They would be expected to get, and in all likelihood would get a resin without a crystalline structure. This was pointed out in the February 24<sup>th</sup> affidavit, paragraph 6, where Smith stated that he and his colleagues performed experiments of mixing boehmite materials with resins and obtained ruined resins. A rather mundane analogy is that mixing milk and orange juice will be expected to get you spoiled milk. However, under certain conditions it can get you a creamsicle. Smith '984 teaches milk, Cook teaches orange juice, but the present invention teaches a creamsicle, and that is what is claimed.

The examiner replied to the following arguments as follows:

i) In response to the assertion that omnibus, catch all phrases cannot be given full weight: (From page 3 of the August 4<sup>th</sup>, 2005 Advisory Action.) The Examiner responded that the rejection at hand is an obviousness rejection, not an anticipatory rejection. Presumably he believes that this relieves the prior art from needing to be enabling without undue experimentation. Also, the Examiner put the burden on the Applicant to prove why omnibus statements like the one made in Cook are not enabling, even though applicant had indeed been pointing out that using a LCT resin with Cook would not work since it would ruin the crystalline structure, and supported it with an affidavit.

ii) In response to the assertion that LCT resins are not commercially available at the times in question: (From page 8 of the August 4<sup>th</sup>, 2005 Advisory Action.) In response the Examiner stated that the omnibus statement from Cook not only applies to any *commercially* available resins, but wholly to *any* resins of the prior art. Applicant is stunned at this broadening of the already overly broad Cook quote without anything suggestions from the prior art that this can be done.

iii) In response to the assertion that combining Smith '984 and Cook would produce a ruined resin: (From pages 3-8 of the August 4<sup>th</sup>, 2005 Advisory Action.) In response the Examiner has a flowing 5 pages of chemical diagrams that supposedly brings the present



invention under the teachings of Cook. This is this impermissible hindsight reconstruction without suggestion of motivation. The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention, and reasonable expectation of success is the standard with which obviousness is determined.” *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986). The Examiner also makes improper assumptions and generalizations while performing this hindsight reconstruction. For example, on the bottom of page 4 and onto page 5 oxygen atoms are added based on what “one skilled in the art” would have recognized. At the bottom of page 6 the examiner strips the backbones and generalizes them as R groups. Then on the bottom of page 7, after representing the backbones both as R groups, he states “the skeleton structure appears to have no impact on the reaction mechanism.” Even though one of ordinary skill in art would know that skeleton structures have enormous impact on reaction mechanisms, which was even explained by Dave Smith himself in the interview of September 7<sup>th</sup>, 2005.

In any event, perplexingly enough, the Examiner actually agrees with the assertion that “mixing of particles likely would have disrupted the crystalline structure of the LCT-resin,” but he goes on to state that “this appears to be moot in light of the combined teachings.” (Page 9 of advisory action, middle paragraph.) So the Examiner is stating that obtaining a ruined resin is sufficient prior art, due to the structural similarities that *he* demonstrated, to overcome the crystalline resin of applicant’s invention. However, *even if* the demonstrated structural similarities are accurate, this is simply a mischaracterization of the law. The case law actually states that the presumption of obviousness based on a reference *disclosing structurally similar compounds* may be *overcome* where *there is evidence showing there is no reasonable expectation of similar properties* in structurally similar compounds. *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978). A ruined resin will not produce similar properties to a crystalline resin, therefore any showing of structural similarity is moot.

The Examiner has agreed there is no reasonable expectation of similar properties between the prior art teachings and applicant’s invention (Page 9 of advisory action, middle paragraph, “mixing of particles likely would have disrupted the crystalline structure of the LCT-resin,”) and yet he maintains the rejections anyways.

The “sufficiency of the affidavit” traverse.

The second, and separate, argument is based on the sufficiency of the inventor’s affidavit. As mentioned, the inventor of the present invention is also the named inventor on the primary prior art reference, namely Smith ‘984.

In the after final reply, applicant indicated that the Examiner did not believe the assertions of unexpected results put forth in the February 24<sup>th</sup>, 2005 1.132 affidavit. However, the Examiner stated (bottom of page 10 of the August 4<sup>th</sup>, 2005 Advisory Action):

*It is not a matter of whether or not the Examiner believes the Inventor’s assertions. The matter is that there is no showing of tests or experimental results that support these assertions. Due to the absence of evidence of inoperability of the prior art, Applicant’s assertions constitute mere argument- see MPEP 716.1(c).*

The Examiner, however, is not clear on what evidence is, since he is referring to an affidavit as an attorney argument. If the Examiner quotes only portion of MPEP 716.1 (c). The entirety of MPEP 716.1(c) paragraph II, actually reads:

*717.1 (c) II. ATTORNEY ARGUMENTS CANNOT TAKE THE PLACE OF EVIDENCE*

*The arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965). Examples of attorney statements which are not evidence and which must be supported by an appropriate affidavit or declaration include statements regarding unexpected results, commercial success, solution of a long-felt need, inoperability of the prior art, invention before the date of the reference, and allegations that the author(s) of the prior art derived the disclosed subject matter from the applicant. (Emphasis Added.)*

Applicant was not making an attorney argument, but rather presenting an appropriate affidavit, as is require by 716.01(c). The Examiner improperly used the very rule that requires an affidavit against the Applicant’s affidavit! The February 24<sup>th</sup>, 2005 1.132

affidavit states that unexpected results were found (paragraph 4), including why they were unexpected (paragraph 5), as well as the fact that many experiments did not produce the later achieved unexpected results (paragraph 6).

To bring up examples from case history that further support this position, applicant cites the following cases:

A prima facie case of obviousness based on structural similarity is rebuttable by proof that the claimed compounds possess unexpectedly advantageous or superior properties. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) (Affidavit evidence which showed that claimed triethylated compounds possessed anti-inflammatory activity whereas prior art trimethylated compounds did not was sufficient to overcome obviousness rejection based on the homologous relationship between the prior art and claimed compounds.)

A claim to a compound was rejected over a patent to De Boer which disclosed compounds similar in structure to those claimed (obvious homologs) and a process of making these compounds. Applicant responded with an affidavit by an expert named Wiley which stated that there was no indication in the De Boer patent that the process disclosed in De Boer could be used to produce the claimed compound and that he did not believe that the process disclosed in De Boer could be adapted to the production of the claimed compound. The court held that the facts stated in this affidavit were legally sufficient to overcome the rejection and that applicant need not show that all known processes are incapable of producing the claimed compound for this showing would be practically impossible. *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968).


B. Claim 10 is rejected under 35 USC §103 (a) as being unpatentable over Smith (5,904,984) in view of Cook (6,369,183) and in further view of Stackhouse (4,427,740).

Applicant believes that claim 10 stands or falls with the above arguments concerning the combination of Smith '984 and Cook '183.

## CONCLUSION

As noted, none of the cited art, either alone or in combination, can be said to anticipate or render obvious the appealed claims. The combination of reference would not produce applicant's invention, and the state of the art taught away from such a combination in any event. Further, the affidavit stating unexpected results is sufficient evidence to support such assertions. Accordingly, Appellant believes the rejections to be in error, and respectfully requests the Board of Appeals and Interferences to reverse the Examiner's rejections of all of the claims on appeal.

Respectfully Submitted,



Siemens PGI, per  
Brad Close  
Reg. No. L0226

Tighe Patton PLLC  
1747 Penn. Ave, NW, suite 300  
Washington, DC 20006

(202) 454-2800

## APPENDIX A - THE APPEALED CLAIMS

1. (previously presented) A method of making homogeneous alumoxane-LCT-epoxy polymers with a dielectric strength of at least 1.2 kV/mil and a thermal conductivity in the transverse direction of at least 0.50 W/mK and in the thickness direction of at least 0.99 W/mK in an environment of 25°C comprising:

    mixing at least one LCT-epoxy resin with at least one boehmite material, under sufficient conditions to form a uniform dispersion and an essentially complete co-reactivity of said at least one boehmite material with said at least one LCT-epoxy resin, wherein a mixture is formed; and

    curing said mixture to produce said homogeneous alumoxane-LCT-epoxy polymers;

    wherein the amount of said at least one boehmite material to said at least one LCT-epoxy resin comprises a ratio of between 3:17 and 13:7 by weight.

2. (original) The method of claim 1, wherein said at least one boehmite material comprises carboxylate-alumoxane.

3. (original) The method of claim 2, wherein said carboxylate-alumoxane is 4-hydroxybenzoate-alumoxane.

4. (original) The method of claim 1, wherein the alumoxane portions of said homogeneous alumoxane-LCT-epoxy polymers is 20-50% by weight.

5. (original) The method of claim 1, wherein mixing said at least one LCT-epoxy resin with said at least one boehmite material comprises first pre-heating said at least one LCT-epoxy resin until said at least one LCT-epoxy resin is clear.

6. (original) The method of claim 1, wherein mixing said at least one LCT-epoxy resin and said at least one boehmite material further comprises warming until said mixture is clear.

7. (original) The method of claim 1, further comprising mixing at least one anhydriding agent with at least one of said at least one LCT-epoxy resin and said boehmite material, wherein said homogeneous alumoxane-LCT-epoxy polymers are a homogeneous alumoxane-LCT-epoxy-anhydride polymers.

8. (original) The method of claim 7, wherein said anhydriding agent is taken from the group consisting of 1-methylhexahydrophthalic anhydride and 1-methyltetrahydrophthalic anhydride.

9. (original) The method of claim 7, wherein said anhydriding agent is approximately 25-45% by weight of said homogeneous alumoxane-LCT-epoxy-anhydride polymers.

10. (original) The method of claim 1, wherein curing of said mixture comprises adding one of the group consisting of zinc naphthenate and chromium acetylacetonate.

11. (original) The method of claim 1, wherein said mixture is added to an electrical insulator as a coating before curing.

12. (previously presented) A method of making homogeneous alumoxane-LCT-epoxy polymers with a dielectric strength of at least 1.2 kV/mil and a thermal conductivity in the transverse direction of at least 0.50 W/mK and in the thickness direction of at least 0.99 W/mK in an environment of 25°C coated on at least one electrical insulator comprising the steps of:

mixing at least one LCT-epoxy resin with at least one boehmite material, wherein a mixture is formed;

warming until said mixture is clear and under sufficient conditions to form a uniform dispersion and an essentially complete co-reactivity of said at least one boehmite material with said at least one LCT-epoxy resin;

impregnating said mixture onto said electrical insulator; and

curing said mixture to produce said homogeneous alumoxane-LCT-epoxy polymers;

wherein the amount of said at least one boehmite material to said at least one LCT-epoxy resin comprises a ratio of between 3:17 and 13:7 by weight.

13. (original) The method of making homogeneous alumoxane-LCT-epoxy polymers coated on at least one electrical insulator as in claim 12, further comprising adding to said at least one LCT-epoxy resin at least one anhydriding agent prior to adding said boehmite material, wherein said homogeneous alumoxane-LCT-epoxy polymers are homogeneous alumoxane-LCT-epoxy-anhydride polymers.

14. (original) The method of making homogeneous alumoxane-LCT-epoxy polymers coated on at least one electrical insulator as in claim 12, wherein said electrical insulator is a mica/glass insulating tape.

15. (original) Homogeneous alumoxane-LCT-epoxy polymers comprising:

- at least one alumoxane containing sub-structure;

- at least one LCT-epoxy sub-structure;

- thermal conductivity in the transverse direction of at least 0.50 W/mK and in the thickness direction of at least 0.99 W/mK in an environment of 25°C; and

- dielectric strength of at least 1.2 kV/mil;

- wherein said alumoxane substructure is organically bonded to said LCT-epoxy substructure;

- wherein approximately 15-65 % by weight of said homogeneous alumoxane-LCT-epoxy polymers is said alumoxane sub-structure; and

- wherein said homogeneous alumoxane-LCT-epoxy polymers are substantially free of particle wetting and micro-void formation.

16. (original) The homogeneous alumoxane-LCT-epoxy polymers of claim 15, wherein said alumoxane sub-structure comprises carboxylate-alumoxane.

17. (original) The homogeneous alumoxane-LCT-epoxy polymers of claim 16, wherein said carboxylate-alumoxane is 4-hydroxybenzoate-alumoxane

18. (original) The homogeneous alumoxane-LCT-epoxy polymers of claim 15, wherein said homogeneous alumoxane-LCT-epoxy polymers contain at least one anhydride, and wherein said anhydride portion is approximately 25-45% by weight of said homogeneous alumoxane-LCT-epoxy polymers.

19. (original) The homogeneous alumoxane-LCT-epoxy polymers of claim 15, wherein said homogeneous alumoxane-LCT-epoxy polymers are integrally formed with at least one electrical insulator.



## **APPENDIX B – EVIDENCE APPENIX**

Appellant references the Smith § 132 Affidavit which was submitted with the January 26<sup>th</sup>, 2005 Amendment, and which the Examiner specifically addressed in his May 19<sup>th</sup>, 2005 Final Office Action (see Page 9). The attached copy is unsigned, since the signed copy was sent to the PTO, but is otherwise identically to the copy submitted January 26<sup>th</sup>, 2005.



Appl. No. : 10/618,111  
Inventor : Smith, James D  
Filed : 07/11/2004  
A.U. : 1712  
Examiner : Feely, Michael J  
Client Ref: 2003P08574US

Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

**Declaration of James D. Smith  
Under 37 CFR 1.132**

Sir:

I, James D. Smith, hereby declare as follows:

1. I have studied 8 years at Aberdeen University, Scotland and Syracuse University, NY. I have worked for Siemens Westinghouse Power Corp. for 35 years in the areas of High Voltage Electrical Insulation Polymers for motors and generators.
2. I am the first named inventor on the pending patent application as well as on the primary prior art cited in the January 26<sup>th</sup>, 2005 office action, namely 5,904,984 (Smith '984). I have thoroughly read and am intimately familiar with all information disclosed in this source as well as the secondary reference of Cook 6,369,183 (Cook '183).
3. One of ordinary skill in the art would not combine Cook '183 with Smith '984.
4. First off, it was unexpected that liquid crystal thermoset (LCT) resins could be used in any manner as enhanced thermally conductive resins. Generally the better a resin is at electrical insulation, the better it is at thermal insulation. So the combination of anything with LCT resins to produce a resin with the thermal conductivity we obtained,

at least 0.50 W/mk in the transverse direction and at least 0.99 W/mK in the thickness direction, was very interesting.

5. More specific to the issue of Cook '183 with Smith '984, is that a practitioner in my field would not expect to be able to mix any significant amount of materials in with an LCT resin and maintain the crystalline micro-structure that give the cured resin its electrical insulation properties (dielectric strength). What make the LCT a good electrical insulation is the highly organized crystalline micro-structure that it achieves when curing. Fillers, such as alumina, are relatively large materials that disrupt crystalline formation, especially at the large 15-65% wt. quantities described in the application.

6. Myself and my colleagues did experiments on the effect of adding fillers, such as alumina and silica, to the LCT epoxies and noticed that we had a deleterious effect on both physical and electrical properties as shown by a significant drop in HDT (heat distortion temperature) and dielectric strength due to the disruption of the crystalline structure.

7. By mixing the alumoxanes of Cook '183 with the LCT of Smith '984 one would expect to get, and would in all likelihood end up with, a ruined LCT resin that has disrupted crystalline domains and phase separation with the added alumoxanes. This disruption in crystalline structure and phase separation would result in the degradation of the high performance properties of a LCT epoxy resin.

Dated this 24th day of February, 2005

Monroeville, PA

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James D. Smith



## **APPENDIX C – RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.